

USSN 10/068,159

Response

**Amendments to the Claims**

Please amend the claims as follows:

1. (currently amended) A stacked die assembly, comprising:  
at least two semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a first surface having terminal pads ~~disposed~~ located thereon, and a second surface;  
a first die ~~disposed on the first surface of the substrate, and~~ comprising a first surface having bond pads ~~disposed~~ located thereon, a second surface situated on the first surface of the substrate, and bonding elements connecting the bond pads to the terminal pads on the substrate; and  
a second die comprising a first surface, a second surface, and a perimeter; the first surface having bond pads ~~disposed~~ located thereon; the second surface situated on the first surface of the first die and comprising a non-beveled ~~second~~ recessed edge portion along the perimeter of the die; ~~the second die disposed on the first surface of the first die with the bond pads on the first die positioned within the recessed edge portion; the non-beveled~~ recessed edge portion having a height sufficient for clearance of the bonding elements extending from the bond pads of the first die.
2. (currently amended) A stacked die assembly, comprising:  
at least two semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a first surface having terminal pads ~~disposed~~ located thereon, and a second surface;  
a first die ~~disposed on the first surface of the substrate; the first die~~ comprising an active surface having bond pads ~~disposed~~ located thereon, an opposing inactive surface situated on the first surface of the substrate, and bonding elements connecting the bond pads of the first die to the terminal pads on the substrate; and  
a second die comprising an active surface, an opposing inactive surface, and a perimeter; the active surface having bond pads ~~disposed~~ located thereon; the inactive surface situated on the active surface of the first die and having a non-beveled recessed edge portion

MKE/1087474.1

2 of 19

USSN 10/068,159

Response

along the perimeter of the die; ~~the second die disposed on the active surface of the first die with the recessed edge portion~~ providing an opening over the bond pads of the first die, the opening sufficient for passage of the bonding elements therethrough.

3. (currently amended) A stacked die assembly, comprising:

at least two semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a surface having terminal pads ~~disposed~~ located thereon;

a first die ~~disposed on said surface of the substrate; the first die~~ comprising a first surface having bond pads ~~disposed~~ located thereon, a second surface situated on the surface of the substrate, and bonding elements connecting the bond pads of the first die to the terminal pads on the substrate; and

a second die comprising a first surface, an opposing second surface, and a perimeter; the first surface having bond pads ~~disposed~~ located thereon; the second surface situated on the first surface of the first die and having a thickness removed along the perimeter of the die to provide a non-beveled recessed edge portion; ~~the second die disposed on the first surface of the first die with the bond pads of the first die~~ situated within the recessed edge portion; the recessed edge portion having a sufficient height for clearance of the bonding elements extending from the bond pads on the first die.

4. (currently amended) A stacked die assembly, comprising:

at least two semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a surface having terminal pads ~~disposed~~ located thereon;

a first die ~~disposed on said surface of the substrate; the first die~~ comprising a first side having bond pads ~~disposed~~ located thereon, an opposing second side situated on the surface of the substrate, and bonding elements connecting the bond pads of the first die to the terminal pads on the substrate; and

a second die comprising a first side, an opposing second side, and a perimeter; the first side having bond pads ~~disposed~~ located thereon; the second side situated on the first side of

MKE/1087474.1

3 of 19

USSN 10/068,159

Response

~~the first die and~~ comprising a non-beveled recessed edge ~~portion~~ along the perimeter of the die; ~~the second die disposed on the first side of the first die with the bond pads of the first die~~ disposed situated within the non-beveled recessed edge ~~portion~~ of the second die, the recessed edge ~~portion~~ having a height sufficient for passage of the bonding elements from the bond pads of the first die therethrough.

5. (previously presented) The die assembly of Claim 4, further comprising: bonding elements connecting the bond pads of the second die to the terminal pads on the substrate.

6. (currently amended) The die assembly of Claim 4, further comprising: at least one of an adhesive element ~~disposed~~ situated between the first die and the substrate, and an adhesive element ~~disposed~~ situated between the second die and the first die.

7. (original) The die assembly of Claim 6, wherein the adhesive element comprises a die attach adhesive.

8. (original) The die assembly of Claim 6, wherein the adhesive element comprises a tape adhesive.

9. (original) The die assembly of Claim 4, wherein the second die has at least one of a length and a width greater than the first die.

10. (original) The die assembly of Claim 4, wherein the bonding element comprises a TAB tape.

11. (original) The die assembly of Claim 4, wherein the bonding element comprises a wire bond.

USSN 10/068,159

Response

12. (original) The die assembly of Claim 4, wherein the substrate comprises a material selected from the group consisting of bismaleimide triazine resin, epoxy resins, ceramics, and polyimide resins.

13. (original) The die assembly of Claim 4, wherein the substrate comprises a metal leadframe.

14. (original) The die assembly of Claim 4, being at least partially encapsulated.

15 - 23. (cancelled)

24. (currently amended) A stacked die assembly, comprising:

a plurality of semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a first surface having terminal pads ~~disposed~~ located thereon, and a second surface;

a first die ~~disposed on the first surface of the substrate, and~~ comprising a first surface situated on the first surface of the substrate, and a second surface having a recess formed therein; and

a second die at least partially ~~disposed in~~ situated within the recess of the first die, and comprising a first surface having bond pads ~~disposed~~ located thereon, an opposing second surface ~~disposed~~ situated on the first die within the recess, and bonding elements connecting the bond pads of the second die to the terminal pads on the substrate; and

a third die comprising a first surface, an opposing second surface, and a perimeter, the first surface having bond pads ~~disposed~~ located thereon; and the second surface situated on the first surface of the second die and comprising a non-beveled recessed edge ~~portion~~ along the perimeter; ~~the second surface of the third die disposed on the first surface of the second die~~ whereby the non-beveled recessed edge ~~portion~~ provides sufficient clearance for the bonding elements extending from the bond pads of the second die.

USSN 10/068,159

Response

25. (currently amended) A stacked die assembly, comprising:

a plurality of semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a first surface having terminal pads ~~disposed~~ located thereon, and a second surface;

a first die comprising a first surface ~~disposed~~ situated on the first surface of the substrate in a flip chip attachment, and a second surface having a recess, ~~the recess having a surface~~; and

a second die at least partially disposed in the recess of the first die, and comprising a first surface having bond pads ~~disposed~~ located thereon, an opposing second surface ~~disposed~~ on the surface of situated on the first die within the recess, and bonding elements connecting the bond pads of the second die to the terminal pads on the substrate; and

a third die comprising a first surface, an opposing second surface, and a perimeter; the first surface having bond pads ~~disposed~~ located thereon; and the second surface situated on the first surface of the second die and comprising a non-beveled recessed edge portion along the perimeter; ~~the second surface disposed on the first surface of the second die whereby the non-beveled recessed edge portion~~ provides sufficient clearance for the bonding elements extending from the bond pads of the second die.

26. (original) The die assembly of Claim 25, wherein the recess in the first die is substantially square or rectangular shaped.

27. (original) The die assembly of Claim 25, wherein the recess in the first die is substantially oval or circular shaped.

28. (previously presented) The die assembly of Claim 25, further comprising: bonding elements connecting the bond pads of the third die to the terminal pads on the substrate.

29. (currently amended) The die assembly of Claim 25, further comprising: at least one of an adhesive element ~~disposed~~ situated between the first die and the second die, and an adhesive element ~~disposed~~ situated between the second die and the third die.

MKE/1087474.1

6 of 19

USSN 10/068,159

Response

30. (original) The die assembly of Claim 25, wherein the third die has at least one of a length and a width greater than the second die.

31. (original) The die assembly of Claim 25, being at least partially encapsulated.

32. (cancelled)

33. (currently amended) A stacked die assembly, comprising:

at least two semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a first surface having terminal pads ~~disposed~~ located thereon, and a second surface;

a first die ~~disposed on the first surface of the substrate; the first die~~ comprising a first surface having bond pads ~~disposed~~ located thereon, and an opposing second surface having a recess formed therein; ~~the first die and~~ attached to the substrate by an adhesive element ~~disposed~~ situated within the recess; and bonding elements connecting the bond pads of the first die to the terminal pads on the substrate; and

a second die comprising a first surface, an opposing second surface, and a perimeter; the first surface having bond pads ~~disposed~~ located thereon; the second surface situated on the first surface of the first die and comprising a non-beveled recessed edge along the perimeter which; ~~and the second die disposed on the first surface of the first die whereby the recessed edge provides sufficient clearance for the bonding elements extending from the first die.~~

34. (currently amended) The die assembly of Claim 33, wherein the adhesive element ~~disposed~~ situated within the recess comprises one of a die attach adhesive, and a tape adhesive.

35. (currently amended) The die assembly of Claim 33, further comprising: a second adhesive element ~~disposed~~ situated between the first die and the second die.

MKE/1087474.1

7 of 19

USSN 10/068,159

Response

36. (previously presented) The die assembly of Claim 33, further comprising: bonding elements connecting the bond pads of the second die to the terminal pads on the substrate.

37. (original) The die assembly of Claim 33, wherein the second die has at least one of a length and a width greater than the first die.

38. (original) The die assembly of Claim 33, being at least partially encapsulated.

39-46. (cancelled)

47. (previously presented) A semiconductor die package, comprising the die assembly of Claim 1, further comprising bonding elements connecting the bond pads of the second die to the terminal pads on the substrate, and being at least partially encapsulated.

48. (currently amended) The package of Claim 47, further comprising: external contacts ~~disposed~~ located on the second surface of the substrate.

49. (original) The package of Claim 48, wherein the external contacts comprise a conductive solder, conductive epoxy, or conductor-filled epoxy.

50. (original) The package of Claim 48, wherein the external contacts are in the form of balls, columns, pins, or a combination thereof.

51. (cancelled)

52. (previously presented) A semiconductor die package, comprising the die assembly of Claim 24, further comprising bonding elements connecting the bond pads of the third die to the terminal pads on the substrate, and being at least partially encapsulated.

53 - 111. (cancelled)

MKE/1087474.1

8 of 19

USSN 10/068,159

Response

112. (currently amended) A stacked die assembly, comprising:

at least two semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a first surface having terminal pads ~~disposed~~ located thereon, and a second surface;

a first die ~~disposed on the first surface of the substrate, and~~ comprising a first surface having bond pads ~~disposed~~ located thereon, a second surface situated on the first surface of the substrate, and bonding elements connecting the bond pads to the terminal pads on the substrate; and

a second die comprising a first surface, a second surface, and a perimeter; the first surface having bond pads ~~disposed~~ located thereon; the second surface situated on the first surface of the first die and comprising a non-beveled recessed edge ~~portion~~ along the perimeter of the die; ~~the second die disposed on the first surface of the first die with the bond pads on the first die positioned within the recessed edge portion; the non-beveled~~ recessed edge ~~portion~~ having a height sufficient for clearance of the bonding elements extending from the bond pads of the first die;

means for mounting the first die on the substrate;

means for mounting the second die on the first die; and

means for connecting the bond pads of the first die to the terminal pads on the substrate.

113. (previously presented) The assembly of Claim 112, wherein the mounting means comprises a die-attach adhesive, a tape adhesive, or a combination thereof.

114. (previously presented) The assembly of Claim 112, wherein the connecting means comprises a wire bond.

115. (previously presented) The assembly of Claim 112, wherein the connecting means comprises a TAB tape.

MKE/1087474.1

9 of 19



USSN 10/068,159

Response

116. (previously presented) The assembly of Claim 112, further comprising means for connecting the assembly to an external electrical apparatus.

117. (previously presented) The assembly of Claim 116, wherein the assembly connecting means comprises a conductive solder, conductive epoxy, or conductor-filled epoxy, attached to the second surface of the substrate.

118. (previously presented) The assembly of Claim 116, wherein the assembly connecting means are in the form of balls, columns, pins, or a combination thereof, attached to the second surface of the substrate.

119. (previously presented) The assembly of Claim 112, being at least partially encapsulated to form a die package.

120-123. (cancelled)

124. (currently amended) A stacked die assembly, comprising:

a plurality of semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a first surface having terminal pads ~~disposed~~ located thereon, and a second surface;

a first die ~~disposed~~ comprising a first surface situated on the first surface of the substrate, ~~and comprising a first surface~~ and a second surface having a recess formed therein; and

a second die at least partially ~~disposed in~~ situated within the recess of the first die, and comprising a first surface having bond pads ~~disposed~~ located thereon, an opposing second surface ~~disposed~~ situated on the first die within the recess; and

a third die comprising a first surface, an opposing second surface, and a perimeter; the first surface having bond pads ~~disposed~~ located thereon; and the second surface situated on the first surface of the second die and comprising a non-beveled recessed edge portion along

MKE/1087474.1

10 of 19

USSN 10/068,159

Response

the perimeter; ~~the second surface of the third die disposed on the first surface of the second die;~~

means for mounting the first die on the substrate;

means for mounting the second die in the recess of the first die;

means for mounting the third die on the second die; and

means for connecting the bond pads of the second and third dies to the terminal pads on the substrate;

whereby the non-beveled recessed edge portion of the third die provides sufficient clearance for the connecting means extending from the bond pads of the second die to the substrate.

125. (previously presented) The assembly of Claim 124, wherein the mounting means of the first die comprises a flip chip attachment.

126. (previously presented) The assembly of Claim 124, further comprising means for connecting the assembly to an external electrical apparatus.

127. (previously presented) The assembly of Claim 124, being at least partially encapsulated to form a die package.

128 - 136. (cancelled)

137. (previously presented) An apparatus, comprising:  
an electrical apparatus; and  
the die package of Claim 119 in electrical communication with the electrical apparatus.

138. (previously presented) The apparatus of Claim 137, wherein the electrical apparatus is selected from the group consisting of a PCB, motherboard, program logic controller, and testing apparatus.

MKE/1087474.1

11 of 19

USSN 10/068,159

Response

139. (previously presented) An apparatus, comprising:  
an electrical apparatus; and  
the die package of Claim 119 in electrical communication with the electrical apparatus.
140. (cancelled)
141. (previously presented) An apparatus, comprising:  
an electrical apparatus; and  
the die package of Claim 127 in electrical communication with the electrical apparatus.
- 142-143. (cancelled)
144. (previously presented) A panel substrate, comprising multiple die assemblies according to Claim 1.
145. (cancelled)
146. (previously presented) A panel substrate, comprising multiple die assemblies according to Claim 24.
- 147-148. (cancelled)
149. (currently amended) A stacked die assembly, comprising:  
at least two semiconductor dies ~~disposed~~ situated on a substrate in a stacked arrangement; the substrate comprising a first surface having terminal pads ~~disposed~~ located thereon, and a second surface;

MKE/1087474.1

12 of 19

USSN 10/068,159

Response

a first die ~~disposed~~ situated on the first surface of the substrate, and comprising first and second surfaces, bond pads ~~disposed~~ located on the first surface, and bonding elements interconnecting the bond pads and the terminal pads; and

a second die ~~disposed on the first surface of the first die, and~~ comprising first and second surfaces, a perimeter, bond pads ~~disposed~~ located on the first surface, and the second surface situated on the first surface of the first die, and comprising a non-beveled recessed edge ~~portion~~ along the perimeter of the die; the bond pads on the first die positioned within the non-beveled recessed edge ~~portion~~; the non-beveled recessed edge ~~portion~~ having a height sufficient for clearance of the bonding elements interconnecting the bond pads of the first die and the terminal pads on the substrate.

150. (currently amended) A stacked die assembly, comprising:

a first die ~~disposed~~ situated on a substrate, a second die ~~disposed~~ situated on the first die in a stacked arrangement, and bonding elements interconnecting bond pads ~~disposed~~ located on the first die to terminal pads ~~disposed~~ located on the substrate, the bonding elements ~~disposed~~ situated within a non-beveled recessed edge ~~portion~~ along a perimeter of the second die, the non-beveled recessed edge portion having a height sufficient for clearance of the bonding elements.

151. (currently amended) The die assembly of Claim 150, further comprising: bonding elements connecting bond pads ~~disposed~~ located on the second die to terminal pads on the substrate.

152. (currently amended) The die assembly of Claim 150, further comprising: an adhesive element ~~disposed~~ located on a surface of the first die between the substrate, the second die, or both.

153. (previously presented) The die assembly of Claim 150, wherein the second die has at least one of a length or a width greater than the first die.

MKE/1087474.1

13 of 19

*USSN 10/068,159**Response*

154. (previously presented) The die assembly of Claim 150, wherein the substrate comprises a leadframe.
155. (previously presented) The die assembly of Claim 150, being at least partially encapsulated.
156. (currently amended) The die assembly of Claim 150, wherein the first die is attached to the substrate by an adhesive element ~~disposed~~ situated within a recess within a surface of the die.
157. (currently amended) The die assembly of Claim 150, wherein the first die comprises first and second surfaces, the second die being ~~disposed~~ situated on the second surface, and the first surface comprising a recess.
158. (currently amended) The die assembly of Claim 157, wherein an adhesive element is ~~disposed~~ situated within the recess of the first die.
159. (currently amended) The die assembly of Claim 157, wherein a third die is ~~disposed~~ situated within the recess of the first die.
160. (previously presented) A panel substrate, comprising multiple die assemblies according to Claim 150.
161. (previously presented) An apparatus, comprising:  
an electrical apparatus; and  
the die assembly of Claim 150 in electrical communication with the electrical apparatus.

*USSN 10/068,159**Response*

162. (new) A stacked die assembly, comprising:

a first die situated on a substrate and a second die situated on the first die in a stacked arrangement, the second die having a non-beveled recessed edge along a perimeter with a height sufficient for clearance of bonding elements extending from bond pads on the first die to terminal pads on the substrate.

163. (new) A panel substrate, comprising multiple die assemblies according to Claim 162.

164. (new) An apparatus, comprising:

an electrical apparatus; and

the die assembly of Claim 162 in electrical communication with the electrical apparatus.